

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

WATERING FACILITY

(No.)

CODE 614

DEFINITION

A device (tank, trough, or other watertight container) for providing animal access to water.

PURPOSE

To provide watering facilities for livestock and/or wildlife at selected locations in order to:

- protect and enhance vegetative cover through proper distribution of grazing;
- provide erosion control through better grassland management; or
- protect streams, ponds and water supplies from contamination by providing alternative access to water.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where there is a need for new or improved watering facilities.

CRITERIA

General Criteria Applicable To All Purposes

A trough or tank shall have adequate capacity to meet the water requirements of the livestock and/or wildlife. This will include the storage volume necessary to carry over between periods of replenishment. Animal water requirements can be obtained from the NRCS Engineering Field Handbook, Table 11-1.

Where water supplies are dependable and livestock are checked daily, troughs with little

water storage capacity may be used. Troughs or tanks must provide the daily water requirement of the livestock and provide access to the entire herd within a short period of time. ***The minimum trough or tank capacity will be 100 gallons. 1/***

Automatic livestock waterers may be used where appropriate and where they meet the needs of the operation. Waterers are devices where individual drinking ports or cups provide access for the livestock. They will be used only where the pressure in the system is adequate to meet the manufacturer's requirements for proper operation of the waterer. The minimum number of openings and flow capacities shall be as follows:

	<i>Max. No. of Animals Per Waterer</i>	<i>Min. Capacity Per Waterer</i>
<u>Type Animal</u>	<u>Opening</u>	<u>Opening (GPM)</u>
<i>Dairy Cattle</i>	8	3/4
<i>Beef Cattle</i>	40	3/4
<i>Swine</i>	25	1/4
<i>Horses</i>	10	3/4
<i>Sheep or Goats</i>	40	1/4
<i>Poultry</i>		
<i>Laying Hens</i>	200	1/8
<i>Broilers</i>	100	1/8
<i>Turkeys</i>	50	3/16

Troughs or tanks will be located to provide easy access for livestock, where concentrated animal traffic will not cause

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excessive erosion, and where they will best help to distribute grazing within the fields. Where possible troughs or tanks will be located in fence lines in order to provide water to more than one field.

In intensive grazing systems, the trough or tank may be portable in order to permit movement from one subdivision to another or within the subdivisions. (see requirements for portable troughs or tanks later in this standard).

The site shall be well drained; if not, drainage measures shall be provided. Areas adjacent to the trough or tank that will be trampled by livestock shall be graveled, paved, or otherwise treated to provide firm footing and reduce erosion. Design of the protective surface around the trough shall be in accordance with WV Conservation Practice Standard 561, Heavy Use Area Protection.

Automatic water level control and/or overflow facilities shall be provided ***on all troughs or tanks. Provisions for draining the tank or trough shall be provided for each installation. Overflow pipes may be used as the trough drain when installed such that removal of the overflow standpipe will allow complete drainage of the trough or tank.*** Valves or pipes shall be protected to prevent damage by livestock ***by:***

- 1. Using steel standpipes,***
- 2. Installing valves and/or standpipes near the center of the trough out of reach of livestock, or***
- 3. Installing a metal, wood, concrete, fiberglass or other equally durable plate across the top of the tank, in a manner that will prevent livestock from coming into contact with the valve or standpipe.***

Overflow shall be piped to a stable or suitable point of release, ***but at least 8 ft. from the outside edge of the trough or tank.*** The trough and outlet pipes shall be protected from freezing and ice damage. Freeze-proof troughs or electric heaters may be used.

When a roof is placed over the trough to provide shade, the roof shall be designed for appropriate snow and wind loads and shall be

durable to withstand anticipated livestock and wildlife activities.

All materials shall have a life expectancy that meets or exceeds the planned useful life of the installation. Common construction materials are reinforced concrete, steel, fiberglass, plastic and wood. All designs shall meet the industry standards for the material being used. Generally applicable design requirements and procedures can be found in the documents referenced at the end of this standard.

Concrete structures shall be constructed from a concrete mix producing a minimum compressive strength of 3,000 psi at 28 days. ***Concrete troughs or tanks will have a minimum wall and bottom thickness of 4 inches, except that precast troughs or tanks containing 1.5 lbs. of fiberglass reinforcing fibers per cubic yard of concrete, and cast from concrete having a 28 day compressive strength of 4000 psi or greater, may have a 3" minimum wall thickness. The inside face of the walls of concrete troughs or tanks will have a 2" batter from top to bottom. The minimum steel reinforcement shall be 6 x 6 - 8 ga. x 8 ga. (W2.1 x W2.1) wire reinforcement. Construction joints in concrete troughs or tanks shall have waterstops installed to insure watertight joints.***

Galvanized (***2 oz. per sq. ft. zinc coating***) steel tanks shall have a minimum thickness of 20 gauge. ***Coal-tar enamel coated steel tanks will be 16 gauge minimum.***

Plastic and fiberglass structures shall be made of ultraviolet resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight.

Automatic waterers and lightweight plastic or steel troughs or tanks will be anchored or otherwise protected to prevent livestock from moving or damaging the watering facility by pushing on the sides. This can be accomplished by anchoring the facility to a concrete pad, minimum of 4 inches thick, and/or placing a solid wood, steel or other rigid fence around the facility.

Used heavy equipment tires may be used as troughs or tanks. The landowner is responsible for determining that the used

tire has never been filled with any fluids that may be toxic to animals or that it has been flushed so there are no residues of toxic material in the tire. Tire troughs will be installed as detailed on standard drawing WV-ENG-64.

Pipes in and through the walls or bottom of troughs will be sturdy and durable. The minimum diameter will be 1 1/4 inches for gravity flow systems and 3/4 inches for pumped pressure systems. However, the diameter will be no smaller than the pipeline feeding the trough or tank. Any of the pipes listed in WV Conservation Practice Standard 516, Pipeline, are acceptable outside of the trough, except that polyethylene pipe will not be used where it will be exposed to sunlight. Pipe through the walls or bottom and inside the trough or tank will be polyvinyl chloride (PVC), galvanized steel, or copper meeting one of the following specifications:

<u>Type Pipe</u>	<u>Applicable Specification</u>
PVC	ASTM D-1785, ASTM D-2241 (SDR 26 or less), ASTM D-2665
Steel	ASTM A-120, ASTM A-53, AWWA C-202
Copper	ASTM B-42, ASTM B-43, ASTM
Alloy	B-88, ASTM B-302, ASTM B- 306, ASTM B-585, ASTM B-586, ASTM B-641, ASTM B-642

Collars will be installed where pipes pass through the wall or bottom of the trough or tank.

Openings cast in precast concrete troughs or tanks, for installation of plumbing, will be filled with a nonshrink hydraulic cement or epoxy after installation of the plumbing.

Portable Troughs or Tanks

Portable troughs or tanks will only be used as part of an intensive grazing system, where it is necessary and advantageous to move the watering facility from subdivision

to subdivision. They will not be used where water is needed during freezing weather.

These troughs will normally be lightweight plastic or metal troughs. They may be installed on permanent concrete or gravel pads (minimum 4 inch thickness) or installed on a treated wood or metal skid.

Troughs on skids will be moved to the desired location, leveled with blocking, and anchored to prevent movement.

All portable inlet and outlet pipelines will be protected from livestock damage by burial, installation of shields or covers such as steel casing, or by installing the pipe overhead or along fence lines. Steel pipe will not require special protection. Provisions will be made to drain all above ground inlet and outlet pipes during freezing weather.

Shields or covers installed to protect pipes shall be staked or otherwise fastened to prevent livestock from moving the shield or cover and causing damage to the pipe or connections.

Pipes installed overhead or along fence lines will be attached to a continuous treated wood or steel support that will prevent sagging in the pipe or damage by livestock.

Pads should be located so the trough may be utilized in two or more subdivisions, reducing the need to move the trough as frequently. The pads will incorporate anchor bolts, fence posts or other measures that will prevent movement of the trough by livestock. The pipeline will be installed so it is protected from damage, while the site is being used and when the trough is at another location.

CONSIDERATIONS

This practice may adversely affect cultural resources and must comply with GM 420, Part 401.

Topography should be evaluated to minimize trail erosion and flooding erosion from tank overflow.

Watering facilities should be accessible to small animals. Escape ramps for birds and small animals should be installed.

Adequate protection for livestock during the winter should be considered.

Inlet pipes should be installed with a capped cleanout pipe extending under and beyond the edge of the trough or tank, particularly where silt or sediment may enter the system.

Overflow pipes should be protected with leaf guards when troughs or tanks are installed in or near wooded areas.

PLANS AND SPECIFICATIONS

Plans and specifications for installing troughs and tanks shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the trough or tank is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

Development of plans ***and specifications*** will be ***in accordance with the National Engineering Handbook (NEH) Part 650***, Engineering Field Handbook, Chapter 5, and the National Engineering Manual (***NEM***), Parts 541 and 542.

OPERATION AND MAINTENANCE

An O&M plan specific to the type of installed trough or tank shall be provided to the landowner. ***It shall outline the minimum maintenance necessary to ensure the facility functions properly. For most installations, the Maintenance Tips Brochures for Spring Developments or Ponds can be used.*** The plan shall include, but not be limited to, the following provisions:

- check for debris, algae, sludge or other materials in the trough which may restrict the inflow or outflow system;
- check for leaks and repair immediately if any leaks are found;
- check the automatic water level device to insure proper operation;
- check to ensure that adjacent areas are well protected against erosion;
- check to ensure the outlet pipe is freely operating and not causing erosion problems; and
- prepare guidance for winter weather, such as adding material in the storage area to allow for ice expansion without damage.

Algae and iron sludge accumulation should be addressed in areas with water quality that is known to cause problems. Chemicals such as copper sulfate and chlorine can be recommended as needed, as long as local rules and regulations are followed.

1/ Bold Italics - Modifications of the National Standard by WV.

REFERENCES

Engineering Field Handbook

National Engineering Manual

Manual of Steel Construction, American Institute of Steel Construction

Timber, National Design Specification for Wood, American Forest and Paper Association

Concrete, ACI 318, American Concrete Institute

Masonry, Building Code Requirement for Masonry Structures, ACI 530, American Concrete Institute

**CONSTRUCTION SPECIFICATION
WEST VIRGINIA
WATERING FACILITY, TROUGH OR TANK**

The tank, trough or site pads will be installed at the locations shown on the drawings.

The foundation area shall be cleared of all vegetation, topsoil, wet soils and any other material not suitable for the subgrade. The foundation and the area immediately surrounding shall be graded and smoothed to permit free drainage of surface water. The tank or trough shall be placed on original ground when possible. If low areas are encountered, they will be backfilled with gravel.

Install trough or tank inlet and outlet pipes in trenches as shown on the drawings. The pipes will be placed carefully in the trench to prevent damage and the trenches will be backfilled. The trench bottom and backfill material shall be free of rocks or other sharp-edged material that could damage the pipe. Backfill will be placed such that deformation or displacement of the pipes does not occur. The backfill material will be compacted to a density equivalent to the surrounding ground.

Precast concrete, steel, plastic, fiberglass or other approved premanufactured troughs or tanks will be placed on the site in the manner detailed on the drawings. Embedment, anchor pads, fence or other protection will be installed as shown.

Concrete for site cast troughs or tanks shall be ready-mixed concrete (minimum 28 day compressive strength of 3000 psi), pre-bagged commercially available concrete mix, or site mixed concrete. Concrete and reinforcing steel will meet the requirements of Specifications 732, Concrete and 734, Steel Reinforcement.

If required, as shown on the drawings, surface protection in the form of gravel, pavement or other protective material will be installed around the trough or tank.

All materials used in installation of the trough or tank will be in good condition and meet the applicable ASTM or commercial specifications shown on the drawings.

Upon completion of construction, all disturbed areas will be graded smooth and blend with the surrounding ground. Vegetation will be established by applying seeding and mulching materials as described on the drawings.

Construction operations will be carried out in such a manner that erosion and air and water pollution will be minimized and held within legal limits.

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